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## ABSTRACT

The East Tennessee State University College of Education has begun removing objective testing from regularly scheduled class time and has begun using Macintosh computers for content tutoring and the evaluation of students at their convenience. The new testing program requires students to meet criteria for the number of correct responses within deadlines for each unit. This study, conducted at the College of Education Instructional Evaluation Laboratory (CEIEL), examined course dropout rates and content mastery over six semesters among students in undergraduate educational psychology and special education classes. Students who were traditionally evaluated took multiple choice tests in class over the identical content units that were experimentally evaluated in the CEIEL program. Traditionally evaluated students received feedback (a grade and explanation) within 7 days. Experimentally evaluated students could receive feedback after each question, instantly, or after the whole test was completed, or both, or none at all (their option). Most chose feedback after each question. After the evaluation in CEIEL students were required to have their obtained data verified by a manager who assisted them in plotting their frequencies for correct and incorrect answers. Data collected over six semesters shows that the great majority of students preferred the computer testing format and achieved high levels of content mastery. In addition, use of the CEIEL resulted in a lower frequency of dropout from the classes studied as well as a 10% to 20% gain in class time available for the types of substantive interaction that only faculty can provide. Requirements for course letter grades and examples of graphs used to plot student progress are appended. (10 references) (GL)

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Computers and Professors: Dividing the Work

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## Computers and Professors: Dividing the Work

### Introduction

This presentation describes the College of Education Instructional Evaluation Laboratory (CEIEL) at East Tennessee State University. Software used in the CEIEL program was designed by Dr. Charles Olander and graciously given to us by Dr. Claudia McDade, Director, The Center for Individualized Instruction at Jacksonville State University, Alabama. The college has begun, course by course, removing objective testing from regularly scheduled class time and using Macintosh computers for content tutoring and the evaluation of students at their convenience. The testing program requires students to meet criteria for the number of correct responses (90%) (at a frequency of 10 per minute or higher) within deadlines for each unit which leads to mastery of course content and builds test taking skills among students who will eventually have to pass the national Teachers Examination for certification. The program provides instant feedback and self-graphing after each session which are accelerating consequences and also guides students' further study (Olander, et al., 1983; Merbitz & Olander, 1980). An additional benefit from allowing multiple attempts at each test (randomly selected items from a large pool of items for each unit) without penalties appears to be the reduction of test anxiety.

CEIEL Macintosh computers implement basic principles of learning more effectively than professors can within the typical traditional evaluation context of higher education (Hankins & Spangler, 1975).

### Subjects

Undergraduate students enrolled in 2nd period Educational Psychology classes were used in this study. Three classes of undergraduate students were evaluated traditionally and three classes were evaluated in the College of Education Instructional and Evaluation Lab. Data were also collected on the performance of Senior level Special Education students taking late afternoon classes; one traditionally evaluated, one evaluated in CEIEL.

### Procedures

Data were collected on drop out rates as well as content mastery over six semesters with the Educational Psychology classes. Data were also collected on content mastery and retention with the Special Education students.

Students traditionally evaluated took multiple choice tests in class over the identical content units that were experimentally evaluated in the College of Education Instructional and Evaluation Lab. Traditionally evaluated students received feedback (a grade & explanation) within seven days. Experimentally evaluated students could receive feedback after each question instantly (positive reinforcement or punishment delivered on a FR1 schedule), or after the whole test was completed, or both, or could receive no feedback at all; their option. Most chose feedback after each question. After the evaluation in CEIEL students are required to have their obtained data verified by a manager who assists them in plotting their frequencies correct and incorrect on a Standard Celeration Chart. These managers provide encouragement for additional studying and praise and approval for improvement.

## Results

Educational Psychology classes: N=264, (Traditional 125/ Experimental 139) six classes over a three year period, 1985 thru 1988.

Special Education classes: N=23 (Traditional 10/Experimental 13)

Data collected over six semesters shows that the great majority of students prefer the computer testing format and achieve a high level of content mastery (Spangler, Hankins, & Johnson, 1989 pending publication). In addition, there is a ten to 20 percent gain in class time available for the types of substantive interaction that only faculty can provide.

### DROP RATE For 2nd Period Educational Psychology Classes For Six Semesters

| <u>Traditional Test Format</u> |     | <u>CEIEL Format</u> |     | <u>Difference</u> |
|--------------------------------|-----|---------------------|-----|-------------------|
| Spring 87                      | 23% | Spring 88           | 9%  | -14%              |
| Summer 85                      | 22% | Summer 88           | 7%  | -15%              |
| Fall 86                        | 22% | Fall 88             | 18% | -4%               |

### Special Education Classes Comparison Unit I Exam (50 item MC)

#### Traditional Class

N:10  
Announced two weeks  
In advance; study guide  
provided

$$\bar{X} = 77.6$$

#### Experimental Class

N:13  
Unannounced, two  
Weeks after completed  
Unit in CEIEL; no  
study guide provided

$$\bar{X} = 80.6$$

$$t = 1.52$$

Not Significant which is Significant

### Exposure to Curriculum Items

The traditionally evaluated Educational Psychology classes allowed a student to respond to a maximum of two hundred and twenty curriculum items over six units. The average Educational Psychology student engaged in self-tutoring and self-evaluation (CEIEL) has the opportunity to respond to approximately two thousand curriculum items or more over six units. This is an increase in content reading and responding of approximately two thousand curriculum items or more over six units. This is an increase in content reading and responding of approximately x10.

The experimentally evaluated students remembered more Unit I content than the traditionally evaluated students acquired. This duplicates results from 1975 (Hankins & Spangler).

### Increased Class Time with CEIEL

Educational Psychology classes: 8 hours and 50 minutes over the semester

Special Education classes: 6 hours

### Educational Psychology Class

| <u>Acquisition of Content</u> |                      |                                     |
|-------------------------------|----------------------|-------------------------------------|
| Ed. Psy.                      |                      | Fall 1988                           |
| Class                         | <u>Pre-Test Avg.</u> | Class <u>Post-Test Avg.</u>         |
|                               | <u>26.7%</u>         | <u>53.58%</u>                       |
|                               |                      | <u>Gain</u>                         |
|                               |                      | <u>26.9%</u>                        |
| Pre-Test Mean Frequency       | <u>.38</u>           | Post-Test Mean Frequency <u>.92</u> |
| (three times faster)          |                      | <u>.54</u>                          |

### Discussion and Conclusions

CEIEL implements a quality control system on student performance. Students may not move to the next unit of study until they have met at least the "C's" criteria for the current unit. They must study and perform in the lab until they earn a "C" or above; most perform until they earn an A or a B.

By the end of the course all students who have not dropped have at least an average level of competence or higher in all units of study.

Compare this to the traditional mid-term and final; a student could have an F on the first half of the course and an A on the second half and a grade of C for the course. This person is not competent over the first half of the course content and is competent over the last half. Faculty must invest considerable time initially to set up their evaluation components; however, continued maintenance requires little time, and time for constructing and revising additional items and scoring objective tests is drastically reduced.

Appendices

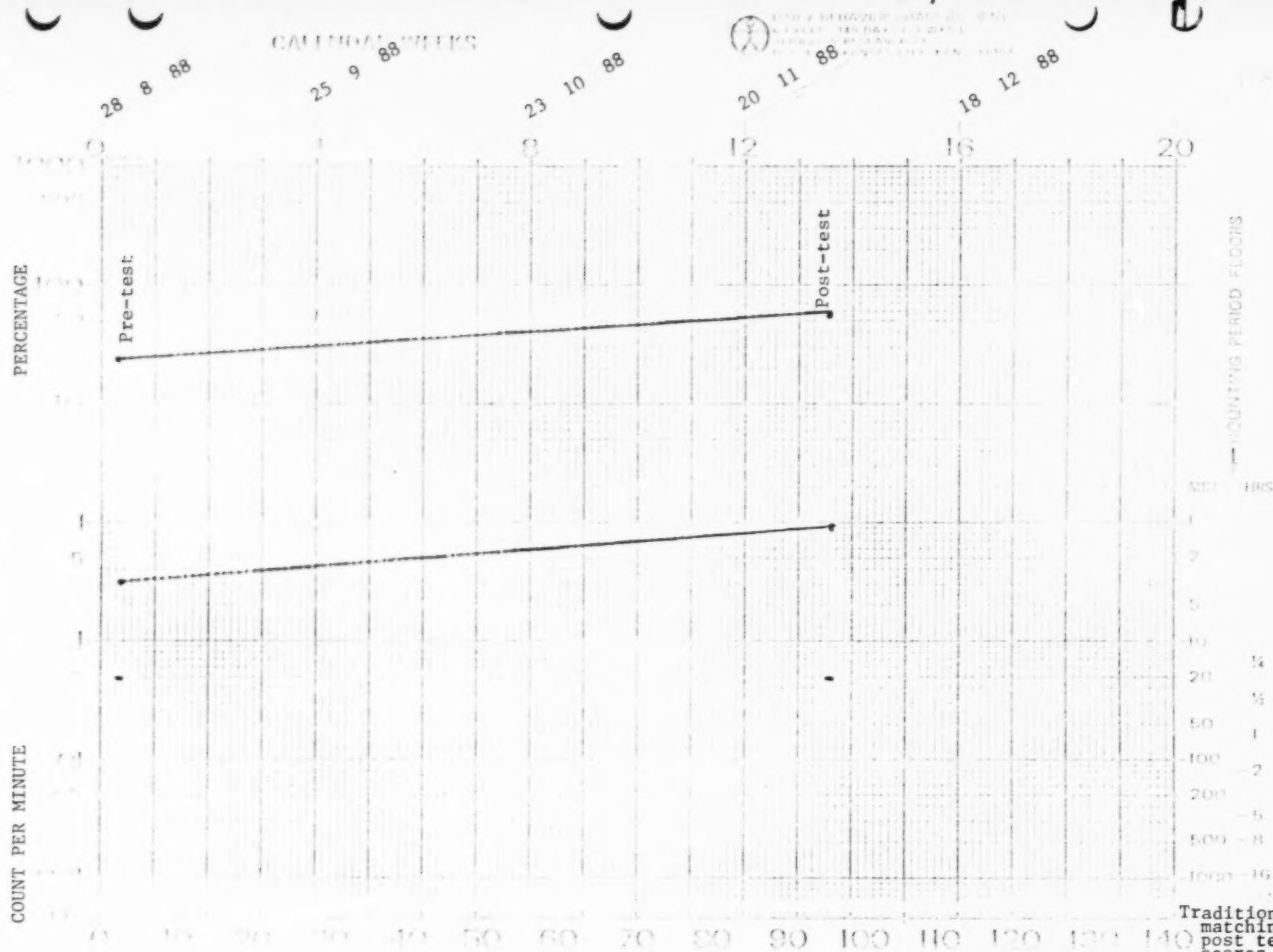
Educational Psychology  
Grade Requirements

Evaluation of Student Performance

Performance on each unit is based on an accuracy score which counts only after the minimum correct responses per minute is reached. For example, the student may choose a score of 70% at 10 correct per minute on Unit I to count toward his/her grade or the student may elect to continue working toward a higher grade, for instance, 90% correct at 10 correct per minute or higher.

| <u>Grade</u> | <u>Unit Evaluation Percentage</u> | <u>Frequency Required</u>                                            |    |    |    |    |    |
|--------------|-----------------------------------|----------------------------------------------------------------------|----|----|----|----|----|
|              |                                   | Units: I II III IV V VI                                              |    |    |    |    |    |
| A            | 90                                | 10                                                                   | 15 | 15 | 20 | 20 | 25 |
| B            | 80                                | 10                                                                   | 15 | 15 | 20 | 20 | 20 |
| C            | 70                                | 10                                                                   | 15 | 15 | 20 | 20 | 20 |
| *D           | 70                                | *but other assignments were not completed or were of minimum quality |    |    |    |    |    |
| *F           | 70                                | *but other assignments were not completed or were of minimum quality |    |    |    |    |    |

Appendix B



Traditional  
matching pre  
post test  
scores mean  
percentages  
& frequencies

Nutter

Spangler

Johnson

Ed. Psych class

20's Undergrad.

N/A

ETSU - CEEL

Apple II

Apple II

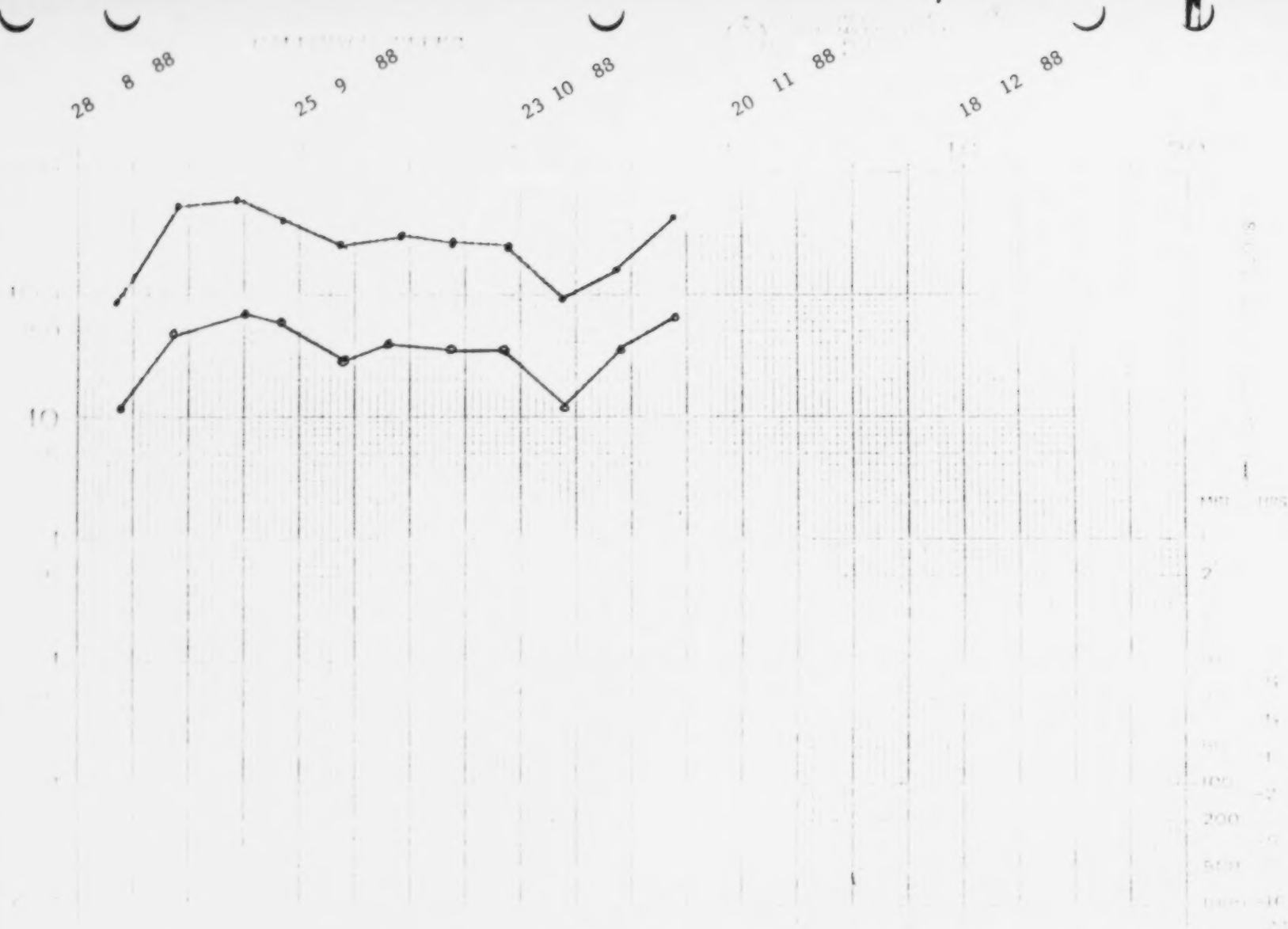
Spangler

10

11

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Appendix 2  
COUNT PER WEEK



Freq. per week  
on self-  
tutoring &  
taking EVAL  
on six Ed.  
Psych. Units

Nutter

Spangler/Johnson

CEIEL  
Managers

Ed. Psych.  
Class

20's Undergrad.

ETSU - CEIEL

Apple II

Apple II

Spangler

• = self-tutoring

o = EVALS

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Appendix D  
COUNT PER WEEK



Nutter Spangler/Johnson CEIEL Managers

Spec. Educ class 20's Undergrad.

Frequency per week of self-tutoring & taking EVAL on Four Spec. Educ. Units

N/A

ETSU-CEIEL

Apple II

Apple II

Spangler  
CHARTER

14

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15

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